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Report and Proceedings

OF THE

BELFAST

Natural History and Philosophical Society,

FOR THE

SESSION 1885-86.



BELFAST:

PRINTED BY ALEXR. MAYNE & BOYD, 2, CORPORATION STREET,
(PRINTERS TO THE QUEEN'S COLLEGE).

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Belfast Natural History and Philosophical Society.

ESTABLISHED 1821.

SHAREHOLDERS.

- 1 Share in the Society costs £7.
- 2 Shares „ „ cost £13.
- 3 Shares „ „ cost £21.

The proprietor of 1 Share pays 10s. per annum ; the proprietor of 2 Shares pays 5s. per annum ; the proprietor of three or more Shares stands exempt from further payment.

MEMBERS.

There are two classes, Ordinary Members, who are expected to read Papers, and Visiting Members, who, by joining under the latter title, are understood to intimate that they do not wish to read Papers. The Session for Lectures extends from November in one year till May in the succeeding one. Members, Ordinary or Visiting, pay £1 1s. per annum, due 1st November in each year.

PRIVILEGES.

Each Shareholder and Member has the right of personal attendance at all meetings of the Society, and of admitting a friend thereto ; also of access to the Museum for himself and family, with the privilege of granting admission orders for inspecting the collections to any friend not residing in Belfast.

Any further information can be obtained by application to the Secretary. It is requested that all accounts due by the Society be sent to the Treasurer.

The Museum, College Square North, is open daily from 12 till 4 o'clock. Admission for Strangers, 6d. each. The Curator is in constant attendance, and will take charge of any Donation kindly left for the Museum or Library.

BELFAST

Natural History and Philosophical Society.

ANNUAL REPORT, 1886.

THE Annual Meeting of the Shareholders of the above named Society was held on the 3rd June, 1886, at three o'clock, in the Museum, College Square North. There were present :—The President, Mr. W. H. Patterson, M.R.I.A. ; Mr. R. L. Patterson, J.P., F.L.S. ; Mr. Robert Young, C.E. ; Mr. Robert M. Young ; Mr. Thomas Workman, J.P. ; Mr. Wm. Gray, M.R.I.A. ; Mr. Wm. Swanston, Rev. John Kinghan, Mr. W. Meharg, and Mr. Isaac Ward.

The Secretary (Mr. R. M. Young) read the report as follows :—
“ The Council of the Natural History and Philosophical Society, appointed by the shareholders at their annual meeting on the 14th May, 1885, desire to submit their report of the working of the Society during the past year. The winter session was opened on November 3rd, 1885, with an address from your President, Mr. Wm. H. Patterson, M.R.I.A., the subject selected being ‘The History and Legends of some Irish Lakes.’ The second meeting was held on January 5th, 1886, when Mr. Thomas Workman, J.P., read a paper on ‘Eastern Reminiscences, Aden, India, and Burmah.’ The lecture was illustrated by a series of admirable photographs and lantern views. The third meeting was held on February 2nd, 1886, when Professor Fitzgerald read a paper on ‘The Forth Bridge,’ illustrated by a model and diagrams. Mr. Wm. Swanston, F.G.S., also gave a paper on ‘Supposed Saurian Remains from the Antrim Chalk.’ A short communication by Mr. John Anderson, J.P., F.G.S., on ‘A Human Skull Recently Found at Tillysburn,’ was also

read. The fourth meeting was held on March 2nd, 1886, when Mr. John Brown read a paper on 'An Experimental Fishing Trip off the North and East Coast of Ireland.' Mr. Seaton F. Milligan also gave a valuable paper on 'The Ancient Civilisation of Peru, including its Textile Industries,' illustrated by a large collection of specimens of woven and dyed fabrics, patterns, personal ornaments, &c., excavated from the Huacas. Samples of modern artistic linen goods were also exhibited for comparison. The fifth meeting was held on April 6th, 1886, when Mr. Joseph J. Murphy, F.G.S., read a paper on 'Wet and Dry Weather,' and Mr. R. Lloyd Patterson, J.P., F.L.S., another on 'A recent Visit to Tory Island,' illustrated by photographs. A short notice of some moths new to Ireland, by Rev. John Bristow, A.M., was also read. Owing to the Parliamentary general election falling about the same date, it was considered advisable to hold no meeting of the Society in December. In addition to these ordinary meetings, your Council arranged for a special series of popular scientific lectures similar to those given in former years. These were well attended, both by members of the Society, who were admitted free, and by the general public. The first of these special meetings was held on January 7th, 1886, in St. George's Hall, when a lecture was delivered by the Rev. J. G. Wood, M.A., F.L.S., on 'Pond and Stream Life.' The second meeting was held on February 4th, 1886, when the Rev. W. S. Green, M.A., gave a lecture on 'My Adventures in the New Zealand Alps.' The concluding meeting of the series was held on March 4th, 1886, in the Ulster Minor Hall, when Mr John Greenhill, Mus. Bac., most kindly gave a lecture on 'Music : Its Science, Theory, and Practice,' with numerous experiments and illustrations.

"It will be seen from the treasurer's report that the financial condition of the Society continues to show improvement. In addition to sale of new shares, all those available which had fallen into arrears within the last six or seven years have been transferred to new holders, who have paid all arrears, and will continue the subscriptions. The number of smaller societies

holding their meetings in the Museum had also greatly increased. The balance now carried forward will, no doubt, enable the Council of next year to carry out some of the much needed work so often deferred for want of funds.

"A list of donations to the Museum and of foreign and home societies, with other publications for the library, is to be printed with the present report. The Council would thank the various donors for their valuable gifts, and particularly Lord Claremont for his thoughtful kindness in presenting six volumes of the Ray Society publications and other valuable books. Captain Robert Campbell, of the ship *Slieve Donard*, has also supplemented his previous generous donations by further interesting specimens collected at foreign ports.

"On Easter Monday the Museum was opened as usual at a nominal charge, and the attendance was, as is always the case, very large.

"The ceiling in the lecture hall, having shown some defects, has been repaired, and some other improvements effected of a trifling kind.

"The library having become overcrowded, arrangements are being made to increase the accommodation for books and pamphlets, of which a large number have been received during the year.

"Your Council now retire from office, and this meeting will be asked to select fifteen members to form a new Council."

*The Belfast Natural History and Philosophical Society in Account with Treasurer,
For Year ending 1st May, 1886.*

Dr.

Cr.

EXPENDITURE.

To Cash paid	£9	0	0
Insurance Premiums ..	..	8	4
Printing Report ..	..	9	17
Advertising ..	..	5	4
Printing and Stationery ..	..	3	16
Water Rate ..	..	3	0
Repairs to Ceiling of Lecture-room	..	0	10
Stamps on Transfer Forms ..	..	2	3
Postage ..	..	7	1
Loss on Popular Lecture Account..	..	25	0
Rent till 1st May ..	..	6	17
Expenses on Easter Monday ..	..	6	8
Collector's Commission ..	..	48	0
W. Darragh, Salary till 1st May ..	..	8	6
S. A. Stewart, Salary till 1st May, less ten months' leave, ..	..	5	0
S. A. Stewart, Gratuity ..	..	13	12
Fuel and Gas ..	..	5	9
Small Accounts ..	..	33	4
To Balance ..	..	£200	14 11

RECEIPTS.

By Balance in hands ..	£10	6	9
Interest on Loan to York St. Spinning Co. ..	..	19	5
Proceeds of Two Shares Sold ..	..	14	0
Donation ..	..	0	8
Contribution from Philo-Celtic Society, 1884-86 ..	..	4	13
Contribution from Beekeepers' Association, 1885-86 ..	..	1	11
Contribution from Naturalists' Field Club, 1885-86 ..	..	5	5
Contribution from Ulster Photographic Society, 1885-86 ..	..	1	5
Transfer Fees ..	..	1	7
Subscriptions ..	..	90	16
Do. Arrears ..	..	10	0
Entrance Fees at door till 1st May ..	..	15	12
Do. on Easter Monday ..	..	26	3

By Balance ..

£200 14 11
£33 4 0

Examined and found correct.

WM. H. PATTERSON, } *Auditors.*
SAMUEL ANDREWS, }

J. BROWN, *Hon. Treasurer.*

May 24th, 1886.

DONATIONS TO THE MUSEUM, 1885-6.

From PEARSON ANDERSON ESQ., DENVER, COLORADO.

Specimen of prairie dog or barking squirrel (*Conomys Columbianus*), shot near Denver.

From CAPTAIN ROBERT CAMPBELL, MASTER OF THE SHIP
"SLIEVE DONARD."

One Malay fighting knife, one pair Afghan boots, one Burmese figure (idol), from the caves at Moulmain, one skin of wild cat, and the skin of the feet of an albatross.

From MISS GRATTAN, COOLGREANY, FORTWILLIAM PARK.

Craniometer used by the late John Grattan Esq., in his cranio-logical researches.

From MR. J. KERNAHAN, GLENNAVY.

Two flint arrow-heads, found near Glenavy.

From CAPTAIN W. H. LOWRY, SINGAPORE. PER W. H. K.
LOWRY, ESQ., KILLYLEAGH.

One Indian snake preserved in spirits.

From CAPTAIN M'CANCE, J. P. KNOCKNAGONEY, STRANDTOWN.

Human skull found when excavating near the shore at Tillysburn.

From WILLIAM SWANSTON, ESQ., F. G. S.

Collection of fossil fish remains (66 specimens, representing 36 species) from the carboniferous limestone of Armagh, and a number of molluscan remains from the same beds.

From JAMES TURNER, ESQ., MOUNTAIN BUSH.

Portion of vertebral column of mososaurus from the hard chalk of Whitewell.

From THOMAS WATSON, ESQ., LONDONDERRY.

Upper stone of an ancient quern, found at St. Johnston, County Donegal.

From THOMAS WORKMAN, ESQ., J. P., CRAIGDARRAGH.

Specimen of Gecko preserved in spirits.



BELFAST
NATURAL HISTORY AND PHILOSOPHICAL SOCIETY,
SESSION, 1885-86.

3rd November, 1885.

The President, MR. W. H. PATTERSON, M.R.I.A., read a
Paper on

THE HISTORY AND LEGENDS OF SOME IRISH
LAKES.

THE leading idea in olden times about a lake was that it came as an intruder to the place in which it rested, and that up to a certain period in the history of the country no lake was there. Regarding the origin of Lough Owel, in Westmeath, there is a legend which tells how a certain fairy or witch who presided over the fertile valley where Lough Owel now rests went on a visit to another witch, who lived in the County of Roscommon, near Athlone, and a very agreeable visit she had till near the end, when her heart became stirred up with envy of a fine lake that the Connaught witch had in her territory, for not only did the lake supply the owner with fish and wild fowl, but by means of it she was enabled to curse her enemies, a practice that witches have been fond of in all times. The cursing was managed by turning certain flat stones at the edge of the water, and ever as the ninth wave lapped over them she pronounced her maledictions. The Westmeath witch determined upon a bold step. She asked for the loan of the lake, saying she wished to see how well it would look in her own valley, and she promised that she

would return it on the very next Monday. The Connaught witch was willing to oblige. "But how, dear, will you take it or send it back?" she asked. "Oh, easy enough; in my pocket-handkerchief," was the answer. And, sure enough, this was the way she managed; and passing safely over Lough Ree and several trifling obstacles, such as rivers and mountains, with a slip of the corner of her handkerchief she let the lake out quietly into the valley of the Owel, where it settled itself as if it had been born and bred there, and there it may be seen to this day; for the Westmeath witch snapped her fingers at her Connaught sister and flatly refused to bring the lake back. Of course there was a terrible row, but the end of it was that the lake was lost to Roscommon for ever, and the former owner had to content herself with as ugly a hollow as anyone ever saw, where once those sweet waters used to flow, all covered with limestone flags as waste as a graveyard. But the lough itself did not like to stay on the Leinster side of the Shannon, and so it sent forth two streams—one from its northern, and another from its southern end—both of which, bounding westwards—and they are called by the people the gold and silver bands—stretched towards Connaught, forming the head waters of the Inney and the Brusna.

However, the Ordnance Survey and the Geological Survey, having passed over the whole of the land, furnished some very clear ideas as to how the lakes of Ireland have been formed. Professor Hull, Director of the Geological Survey, in his work on the physical geology of Ireland, says:—"All the lakes of Ireland may with great probability be classified, as regards their mode of formation, under the three following heads, viz.:—1, lakes of mechanical origin; 2, lakes of glacial origin; 3, lakes of chemical solution." Under the head of mechanical origin, Dr. Hull includes lakes "which, while they may have been modified in form by other agencies, are primarily due to the faults or dislocations of the strata," and in that division he places Lough Neagh and Lough Allen, two remarkable examples of lakes formed in that way.

Dr. Hull says :—"The origin of Lough Neagh has been a subject of much speculation and of some mystery, because, being older than the glacial epoch, it cannot be referred to glacial agency, and, being situated on deposits other than limestones, it cannot be considered as the result of chemical solution. Its proximity to the old volcanic region of Antrim has naturally led to the inference that it was in some way connected with local sinking of the surface through volcanic agency. It was not, however, till the geological structure of the adjoining districts of Tyrone on one side, and Antrim on the other, had been accurately laid down on the maps of the Geological Survey, that a key to the history of its origin was found ; and Mr. W. E. T. Hardman, one of the officers of the Survey, has very ably applied the results of his examination of the district surrounding that lough to the determination of its mode of formation. Its northern portion is bounded by the miocene basalts of Antrim ; its southern, partly by alluvial tracts, partly by masses of drift resting on pliocene clays, which in turn overlie the triassic or carboniferous strata. Its length from north to south is fifteen miles, and its breadth twelve, giving an area of nearly one hundred and fifty square miles. The general depth is only from 20 to 40 feet, gradually increasing towards the northern shore ; and the surface is 48 feet above that of the sea. Mr. Hardman shows that along the southern shores the pliocene clays originally deposited under the waters of the lake rise to a level of 120 feet above the sea, or 72 feet above the existing surface of the lake, showing how much greater the area of the lake must have been in this direction.

"During the progress of the survey it was found that the strata on both sides of the lake are traversed by several large faults ranging in E. N. E. directions. One of these ranges through the basaltic plateau of Antrim by Templepatrick, where the vertical displacement is about 500 feet, the downthrow being on the south side. These faults are later than the basaltic sheets of the miocene age which they displace, and of older date than the pliocene clays, which are not affected by them,

the ground having been smoothed down, and the inequalities caused by the dislocation of the beds having been worn away, by denuding agencies before the clays were deposited. It was to the depression of the surface through the agency of these faults that, according to Mr. Hardman, the formation of the lake is due. This lake, therefore, forms an illustration of a basin formed by the mechanical action of faults in the strata, assisted by the action of running water."

Lakes of glacial origin are found in many parts of Ireland, but chiefly among mountain glens and in front of valleys. These lake-basins are hollow, scooped out of the rock by the action of ice passing over its surface, or else, as Dr. Hull has pointed out, "where moraine matter or boulder clay has been heaped up across a valley or hollow so as to form an embankment for the streams which enter the depression from above." The class of lakes which are due to chemical solution are chiefly found in the great central plain of Ireland, but they are met with in all limestone districts. They are, "strictly speaking, irregular hollows dissolved out of the limestone floor and filled with water." Dr. Hull says that in examining the form of these lakes of chemical solution, "from the manner in which they widen out in some places, and in others become contracted, it will generally be found that they spread themselves out over the ground formed of limestone, and contract where non-calcareous rocks form the bed and margin of the lake. Lough Derg is an illustration of this."

Mr. Patterson then directed attention to the mention made in the "Four Masters" concerning the eruption of lakes, the first eruption being in the year of the world 2532. The passage, as translated by O'Donovan, reads—"The age of the world 2532. The eruption of Loch Con and Loch Techet in this year." O'Donovan explains that Loch Con is a large lake in the barony of Tirauley, and County of Mayo. In the age of the world 3506 the eruption of a large number of the Irish lakes took place. Amongst these was Loch Laogh, the ancient name of Belfast Lough, and which means in Irish the Lake of the Calf. The early monkish writers translated the name into

Latin, and called it *Lacus Vituli*. In the concluding portion of the lecture Mr. Patterson brought under the attention of the meeting a most interesting collection of legends concerning many of the Irish lakes. There were two aspects in which the Irish loughs must be considered when looked at historically. In connection with the many invasions of Danes and Northmen mention was made of the terrible sea fights that had often occurred. Such loughs as Foyle and Swilly, Larne and Belfast, Strangford and Carlingford, Waterford, Wexford, and the estuary of the Shannon, were so many open gates by which these sea rovers entered our country, and from whence they ascended by the river valleys to the more central parts of the island. The other aspect, which he could only mention, was that of the fortified islands, of which such numbers exist in the smaller Irish lakes, most frequently artificial ones, or crannogs. These crannogs were the strongholds of provincial chiefs. They were places of great security, and took the same place among the Irish as the stone castles of the Anglo Normans among the English of the Pale.

5th January, 1886.

MR. JOSEPH J. MURPHY, in the Chair.

MR. THOMAS WORKMAN, J.P., read a Paper on
EASTERN REMINISCENCES—ADEN, INDIA, AND
BURMAH.

Mr. Thomas Workman stated that his lecture was a continuation of a former one, descriptive of his voyage to and residence in different parts of India and Burmah. He commenced by a description of the shores of the Red Sea, referring to the gorgeous colouring of the mountains which crown them. One of these mountains is the famous three-peaked Jebel Katharina, better known by its ancient name of Mount Sinai. The Red Sea, though fog or snow are utterly unknown and storms are very rare, is, nevertheless, one of the most dangerous seas known to navigators, and in it the seaman is never free from anxiety on account of the haze and mirage which prevail. At the island of Perim, where the Red Sea narrows to the straits of Bab-el-Mandeb, or the Gate of Tears, the hulls of many steamers may be seen along the shore as warning beacons to the careless navigator. Its name of Gate of Tears is said to have been given to it because of the disasters sailors met in its vicinity. A short distance round the projecting coastline from the straits of Bab-el-Mandeb is the port and town of Aden, which in Arabic means Paradise, though to the British traveller another name would seem more suitable. The town is situated in a valley—apparently the crater of an extinct volcano—and is surrounded by

mountains of volcanic trap, without vegetation. The water for the supply of the town is collected in the rainy season, in enormous tanks, formed by walls of concrete built across the lower ends of the valleys. In the Bay of Aden the weather is usually lovely. Many beautiful jelly-fish, of every possible hue, may here be seen "within the shadow of the ship"—

"Blue, glossy green and velvet black,
They coiled and swam, and every track
Was a flash of golden fire."

The town and precincts of Colombo, in the island of Ceylon, are exceedingly interesting, both from the richness of the tropical scenery and the picturesqueness of the Kanarese, as the natives of Ceylon are called. The native boats, which are long and narrow, and have a curious outrigger to keep them from capsizing, have always attracted attention from the passing traveller, both from their peculiar construction and their great speed. The Mohammedans have a legend that the Garden of Eden was in heaven and not on earth, and that when Adam and Eve were cast out Adam fell on Adam's Peak, the highest mountain in Ceylon, where the mark of his foot can be seen at the present day to attest the truth of the legend. Eve, they say, fell somewhere else, and she and Adam went about the world for 200 years seeking for one another. Fortunately, by a happy accident, they met in the neighbourhood of Mecca, after an amount of journeying to which the wanderings of Evangeline were but a trifle. The lecturer next gave an account of a visit to the temple of Kali, at Calcutta, and a description of the effigies and pictures of this hideous goddess and her fabled attributes. Kali or Kali Ma—"the black mother," as she is called—is represented as a female with four arms. In one she holds a sword, in another the head of the giant Ravana, whom she has slain; with the other two she is encouraging her worshippers. For earrings she has two dead bodies, and she wears a necklace of skulls. Her only clothing is a girdle made of human hands. She stands with one foot on the thigh and the other on the breast of her husband Siva. It seems impossible to realise that such a hideous figure could be an object of reverence or love to any human being.

The lecturer made some observations on the serious danger of a State education that refuses to deal with religion. Though the Hindu religion seems so terribly degrading that one might at first sight be inclined to say that no religion would be preferable to it, yet it is a grave question whether human nature is not better with a religion of a very low type than without a religion at all, and, of course, when our scientific education comes to these people their present faiths must disappear, leaving nothing under the present system to take its place but blank atheism.

The lecturer described his journey, after leaving Calcutta, to British Burmah, and his visits to the three principal towns—Rangoon, Bassein, and Moulmein. He was much impressed with the enormous size and magnificence of the Showay Dragon Pagoda, or great golden temple of Godama, at Rangoon. The area on which this pagoda stands is 800 feet square. The entrance is approached by an enormous flight of stairs, which is guarded by two huge mystical figures about fifty feet high, with blue heads and red mouths. The pagoda itself is a stupendous mass of solid masonry tapering gradually from an octagonal base, 1,355 square feet in extent, to a spire of small circumference, surmounted by the sacred "tie" or umbrella, of open ironwork. The umbrella is said to be studded with jewels of very great value, and the whole building is one blaze of gold. The "Pooh Yees," or Buddish priests, dress in a long yellow garment, and live in monasteries called kouyns, made of wood, and richly carved. At Maybin, a village on the Irrawaddy, the mosquitoes are so fierce and numerous that large fires have to be lighted by the natives in the evening to keep them away, and even the horses and milch cows are sheltered by mosquito nets. The Burmese seem to lead a quiet, contented life, and, as far as one can judge, are fairly satisfied with the British rule. The women, unlike their sisters in India, are allowed much freedom by social custom, and many of them take an active and independent interest in business affairs, such as the sale of rice and other produce.

Mr. Robert L. Patterson, J.P., F.L.S., said they were all indebted to Mr. Workman for his interesting lecture. Mr. Workman did not appear to have ventured very far into the interior, but the information he had been able to gather was particularly interesting just now, as the attention of everybody in this country had lately been attracted to the action of the British Government in Burmah, and in annexing upper Burmah, in order to put an end to the misrule, the bloodshed, and the cruelty that had obtained there. A friend of his who visited Burmah last year told him a rather curious circumstance, which, in connection with what they had heard that evening, it might not be uninteresting to repeat. Mr. George Burns, of Glasgow, being in Burmah, wished to pay a visit to Mandalay, but was informed that the journey was not unattended with some risk. However, he determined to go. He discovered that on the Irrawaddy navigation could only be carried on by day, as the river was not lighted and was full of obstructions. The journey occupied ten or eleven days. One night they observed a curious object on the shore at some distance from the water edge, and on their going near it they were horrified to find that it was a man who had been crucified that morning. He (Mr. Patterson) was unaware until he learned this that the horrible punishment of death by crucifixion obtained in any country, even in an uncivilised country, at the present day. The man crucified was a dacoit or robber, who, as a rule, scrupled little about committing murder for the purpose of accomplishing their ends. After the dacoit was crucified he had been speared to death, and the vultures were at the time gathering to pick his bones. Mr. Burns, when in Mandalay, had an interview with the Prime Minister, but he was not given an interview with the King. Mr. Burns described the country as being very fertile, and was of opinion that it only required a strong and stable government to bring it to a state of civilisation, in order to make it a good customer of ours. Such a government, he hoped Burmah would have in the future.

3rd February, 1886.

MR. W. H. PATTERSON, M.R.I.A., in the Chair.

PROFESSOR FITZGERALD read a Paper on
 THE NEW BRIDGE OVER THE FIRTH OF FORTH,
Which is now in process of erection.

HAVING stated briefly the greater difficulties which presented themselves in the task of bridging the Forth than even those which had proved so seriously formidable in the Tay, Prof. Fitzgerald said that the former work when finished will be the largest girder bridge in the world, there being no other bridge of that class having so wide a span. The engineer, Mr. Baker, had very considerable difficulties in selecting a design that could be actually carried out. The great difficulty to be dealt with in constructing bridges of long span is the weight of the bridge itself. By means of steel, though not steel of the ordinary kind, being more like fine wrought iron, that primary difficulty was overcome. In large bridges the weight increases faster than the strength, and the advantage of steel is that it gives greater strength than iron, with the same weight. The entire length of the new bridge will be about one mile, and the main span 1,700 feet. The Admiralty required that the bridge should be 150 feet above the water. The depth of the water itself is 150 feet. The foundations rest on solid rock in some parts, and in others in a peculiar clay.

The lecturer then entered into a detailed description of the

character of the foundations and the process by which they were laid. He showed that every test to provide for resistance to wind pressure was being applied. The main span is supported by two huge piers—one at Inchgarney Island—each pier being composed of four towers as large as four ordinary martello towers rolled into one. Having described the plan followed in the forming of the piers and the supports carrying the girders, the Professor, in order to illustrate by a familiar example the extraordinary dimensions of the bridge, supposed an observer standing at the Methodist College looking at a bridge extending to the military barracks in North Queen Street, the rail-level being as high again as the Albert Memorial. He also applied a map of the Boyne Viaduct to the map of the Forth Bridge, and it was seen that the entire of the former structure could be easily accommodated within the main span of the latter. The cost of the new bridge will be about £1,600,000, and the work will probably be completed at the end of two years from the present time.

3rd February, 1886.

The President, Mr. W. H. PATTERSON, M.R.I.A., in the Chair.

WILLIAM SWANSTON, Esq., F.G.S., read a Paper upon an
IMPORTANT LOCAL GEOLOGICAL DISCOVERY.

MR. SWANSTON stated that the notes he had been requested to bring forward referred to a fossil that had been found some time since in the white limestone, or chalk, quarry at Whitewell, and which had now been presented to the Museum by the proprietor (Mr. Turner, of Mountain Bush). The fossil was portion of the vertebral column of a huge reptile, known to the geologists as *Mosasaurus gracilis*, of Owen, and whose nearest living representative is the crocodile. *Mosasaurus gracilis* belonged to a family of giants, remains of specimens having been found that must have measured fully 25 feet in length; while its better known relative, *Mosasaurus princeps*, attained the extraordinary length of 75 feet. The first record of our species as British was made by Dr. Mantell, in his "Geology of the South-East of England." Detached fragments have from time to time since been found in English and Continental strata, and from these it has been pretty clearly made out that the creature's head formed about one-sixth of its entire length, in which respect it resembled the crocodile, but in the shortness of its tail and other respects it was altogether unlike it. From the examination of its remains it can be pretty safely conjectured that it was aquatic and possibly marine in its habits. Its feet were paddle-like in form—more adapted for swimming than for progression on land;

its vertebral column, too, from its apparently extreme flexibility, would tend to confirm this view. The specimen on the table was extremely interesting, as being—so far as can be traced—the first fragment from Irish strata, and from the additional reason that it tends to confirm the view long since advanced that our chalk may be considered as perhaps the highest member of the cretaceous system in the British Islands, and most nearly correlated with the chalk of Maestricht, in Belgium, in which this species attained its maximum of development, and which is considered the highest known zone of the cretaceous system.

A HUMAN SKULL FOUND AT TILLYSBURN.

MR. ROBERT M. YOUNG, B.A., read a communication from Mr. J. Anderson, J.P., Holywood, regarding a human skull which had been found on the 17th January by Captain M'Cance, J.P., about eighteen inches below the surface of the slob, some ten or twelve yards inside the railway embankment, and immediately at the foot of Captain M'Cance's windmill.

Dr. Malcomson, taking the skull in hand, stated to the meeting that the skull was apparently that of a man sixty years of age, and had been dead for probably fifty years. Although it had been suggested that some violence was used to the person who owned the skull, he did not think there was any mark to justify that opinion.

2nd March 1886.

MR. W. SWANSTON, F.R.G.S., in the Chair.

MR. JOHN BROWN read a Paper on
AN EXPERIMENTAL FISHING TRIP OFF THE
NORTH AND EAST COASTS OF IRELAND.

MR. BROWN said that in 1882 he purchased a small steam vessel for the purpose of trawling off the Irish coasts. He had tried most of the trawling grounds along the coast from St. John's Point to Innishowen Head, but without sufficient success on the whole to warrant a continuation of the enterprise. Lough Foyle and the banks outside it were perhaps the best places he had tried. He referred to the decadence of fishing in Belfast Lough, and believed it was due to the trawling on the upper flats and banks in the lough, by which large quantities of small fish were taken, which brought only a nominal price, and such fish were prevented from attaining maturity in the lower portion of the lough. He suggested that one or other of the scientific societies of Belfast should take this matter up, obtain evidence from the fishermen, and, if desirable, take steps to have the upper part of the lough closed to trawlers.

The paper was suitably illustrated with nets and other fishing tackle suspended in the room.

2nd March, 1886.

MR. W. SWANSTON, F.R.G.S., in the Chair.

MR. SEATON F. MULLIGAN read a Paper on
 THE ANCIENT CIVILISATION OF PERU, INCLUDING ITS TEXTILE INDUSTRIES.

MR. MULLIGAN illustrated his lecture with a very interesting and valuable collection of woven and dyed fabric patterns and personal ornaments. This collection of Peruvian antiquities was brought to Ireland by a friend of the lecturer, whose duties as an engineer in Peru gave him opportunities to gratify his archæological taste, and in so doing to make excavations in the ancient Huacas of the people who inhabited that country in ante-Columbian times. Having given a sketch of the civilisation of the ancient Peruvians, the lecturer said he had been requested to compare our modern productions with the ancient fabrics of Peru. There are some lessons to be learned from those ancient fabrics, and there are lessons to be learned from our foreign competitors in the same field. The Ulster manufacturers have not yet got the linen trade of the world entirely to themselves, and it would be well to know what their opponents are doing. The ancient cloths seem to have been finished in the most perfect manner. How different from the fustian of the present day. A very few years ago Manchester goods were almost unsaleable in the India and

China markets, for the natives found their home-made calicoes much better, and the outcry that was raised at the time taught the Manchester manufacturers that honesty was the best policy. During the American war the linen trade in Belfast was particularly good. Cotton could not be procured, and linen had to make up the deficiency. To supply the place of domestic calico a kind of half bleached linen was introduced. No doubt, so far as home consumption was concerned, a splendid opportunity was lost of placing the linen trade on a more extended basis. When cotton again became plentiful it was bought in preference to linen. It seemed to him that we do not sufficiently introduce art in connection with our local linen manufacture, the bulk of our production being plain goods. This did very well so long as a good demand existed for white goods, but unfortunately the white linen trade has been a decreasing one. As far as his experience goes, in the home trade there is not one piece of white linen sold in Ireland for the dozen pieces sold twenty five or thirty years ago. People now order their shirts from the manufacturers, and the latter have introduced a variety of other fabrics which have taken the place of linen. The peasantry of Connaught, who are very conservative in the matter of clothing, are the only people in the country who to any extent wear white shirts. He had brought with him a variety of samples of linen goods, and goods made of linen and cotton, in which a considerable amount of skill and artistic taste was displayed. These goods are made in Germany, and are sold by the agents of German houses both in England and Ireland. The Germans are now pushing the English manufacturers very close in many things. There is in this country a favourable opening for dress fabrics in linen, and mixtures of linen and cotton. For some time past the Irish people have given the preference to home made goods of a suitable kind. There has not been much done in Belfast in this direction yet, and he thought there would be a considerable outlet if some good designs were introduced.

THE OLD GATE AT CARRICKFERGUS.

ON the motion of Mr. Gray, seconded by Mr. Mulholland, it was resolved that this Society co-operate with the Naturalists' Field Club in opposing the intended action of the Grand Jury to remove the old gate at Carrickfergus.

THE OLD CROSS AT DROMORE.

THE Chairman intimated that he had received from one of the Dromore Town Commissioners a letter stating that the old cross of that town would be preserved in the changes that were about to be made, and that the wishes of the Naturalists' Field Club in the matter were being carried out.

6th April, 1886.

The President, MR. W. H. PATTERSON, M.R.I.A., in the Chair.

MR. JOSEPH JOHN MURPHY, read a Paper on
WET AND DRY WEATHER.

THE treatment of the subject was chiefly based on some publications by Dr. Hann, printed in the journal of the Austrian Meteorological Society.

The motive power of all winds ultimately consists in the heat of the sun. When one region becomes warmer than another, as, for instance, land heats more rapidly under the sun than water, or bare ground than ground covered with vegetation, the air flows upward over the heated space, and a wind is formed by the inflow of air along the surface of the earth ; just as the fire in a room draws the air towards it in a draft along the floor. The trade winds consist of such a draft towards the warm regions of the equator.

Storms, as distinguished from mere winds, are due to the condensation of watery vapour in ascending currents of air. When air flows upward the pressure on it from the air above is diminished, because of the less thickness of the aerial strata above it ; the diminution of pressure causes expansion, and the expansion produces cold, whereby the heat that was latent in the vapour is liberated :—and though when vapour is condensed into water the volume of the water is destroyed, yet this is compensated for four or five times over by the liberated heat expanding the air ; which expansion increases the force of the ascending current, and the consequent indraft of wind at its base. The motive power of storms is thus steam power. But storms would not be produced but for another agency, namely, the earth's rotation ; which, though it has no power whatever to set a wind in motion, has a most important modifying influence on winds, as is to be explained further on.

The pressure of the atmosphere on the earth is equal to that of an ocean of quicksilver thirty inches deep, and it is a fact which from its familiarity does not excite the wonder due to it, that this atmospheric ocean is liable to be disturbed by waves, which, as the barometer shows, sometimes attain to a height of at least one fifteenth of its depth. Regions of high barometer are generally those of fine weather, and regions of low barometer those of wet weather, because in the latter ascending currents of air are formed, which are due to the pressure of the air in the neighbouring regions of high barometer. These as they ascend become cooled, and condense the watery vapour which they contain into clouds and rain. At the equator, where the rain-fall is very great, the fluctuations of the barometer are very slight, and it would be the same in all parts of the world were it not for the deflecting effect of the earth's rotation. The simplest instance of this effect is that, as theory and observation alike show, in the northern hemisphere a cannon ball fired at a sufficiently distant mark strikes a point a little to the right of the mark. In the southern hemisphere the corresponding deflection is to the left; and at the equator, where the earth has no rotation in relation to an axis vertical to the horizon, there is no deflection. The deflection is caused by the earth moving in its rotation under the cannon ball; the cannon is in fact fired at a moving mark;—and in the same way, the earth rotating under a current of wind deflects the wind in the northern hemisphere to the right; so that every north wind tends to become an east wind, and every south wind tends to become a west wind. In the southern hemisphere, this effect is of course reversed. This effect of the earth's rotation on the winds was first pointed out by Professor Dové, of Berlin, forty or fifty years ago, and is called Dové's Law; but Mr. Murphy said he believed Dr. Hann had been the first to see the full importance of this law. Theory and observation alike show that the fluctuations of the barometer increase as the distance from the equator increases. They are almost nothing at the equator. At a latitude of 65 the average monthly fluctuation is nearly an inch and a half.

When the most powerful ascending current, and consequent indraft, are set up at the equator, no storm is produced ; but when the same occurs far enough from the equator to enable the earth's rotation to have effect, every current of air as it flows in towards the centre is deflected to the right (or, in the southern hemisphere, to the left), and thus a vortex, or cyclone, is formed, with a rotatory velocity which may be very much greater than the original velocity of indraft. This may be illustrated by filling a wash-hand basin with water, removing the plug at the bottom, and then giving the water a slight rotatory impulse with the hand, when the water will begin to rotate with an impulse very much greater than the force with which it was set in motion. The mechanics of such a water vortex, or whirlpool, closely resemble those of a cyclone or revolving storm ;—the ascending current at the centre of the storm corresponds to the current out through the hole in the bottom of the water basin. Although the earth's rotation in relation to an axis vertical to the horizon is less in tropical than in European latitudes, yet the storms of the tropics are more violent, in consequence of the greater steam power of the atmosphere, due to the hotter climate. On the equator, however, cyclones are not found, because there the earth's rotation does not deflect the wind, either to right or to left.

Dr. Hann has made a mathematical examination of the observed data of some European storms, which shows that the barometric gradient—that is to say the ratio of the difference between the height of the barometer at different places to the distances between those places—is greater than is due to the centrifugal force generated by the rotation of the storm, and he infers that the excess is due to the deflecting force of the earth's rotation.

Mr. Murphy concluded by expressing the opinion that the origin of those fluctuations of the barometer, or barometric waves, which accompany and bring storms, is to be found in the inter-action of currents of air flowing side by side in opposite directions, modified by the earth's rotation.

6th April, 1886.

The President, MR. W. H. PATTERSON, M.R.I.A., in the Chair.

MR. LLOYD PATTERSON, J.P., F.L.S., read a Paper on

A RECENT VISIT TO TORY ISLAND.

SOME merchants and shipowners of Derry, prominent among whom was Mr. James M'Neil, of that city, conceived the idea that it would be a very important matter, not only for the shipping interest, but also for the country at large, that a telegraph and signal station, connected by sub-marine cable with the telegraph system of the United Kingdom, should be established at Tory Island to report passing vessels, being able to communicate with the mainland in case of any shipping disaster or peril, and for such and kindred purposes generally. A meteorological station was also spoken of. Now, as to the value of the signal station there can hardly be two opinions. Situated, as the island is, off the north-west coast of Donegal, it lies in the track of all vessels going north about from any port in the United Kingdom to any port in America. It is the last land they see on their outward voyages, and often the first land they make on their homeward runs. A number of wrecks formerly took place on the island, but these have greatly diminished since the erection there, in 1832, of what was then considered a very fine lighthouse. This lighthouse, one of the usual tower shape, and of enormous strength, is pretty lofty; its lantern, a powerful one, stands 122 feet above the high-water level of the sea, and is visible at a distance of seventeen or

eighteen miles in fair weather. The Commissioners of Irish Lights have been improving and re-erecting lighthouses at various important points round the coasts, and Tory is now having their attention. But I am unable to say whether or not this had been decided on prior to the loss of the gunboat *Wasp* on the island on the 22nd September, 1884. This melancholy event, by which no fewer than 52 persons lost their lives, directed much attention to this lonely island, and invested it with a melancholy interest at the time of our visit. Had a powerful siren, such as has lately been erected on Ailsa Craig, been then in existence at Tory to warn off vessels in thick weather when the light cannot be discerned, the loss of that vessel and so many of her gallant crew might have been averted. Well, it was to awaken more general interest in the establishment of such a signal station, the utility of which, both from a practical and humane point of view, I think, had been demonstrated, that Mr. McNeil organised the trip to the island, in which it was my good fortune (as representing, at the request of its President, my friend Mr. Megaw, the Belfast Chamber of Commerce) to take part. After glancing briefly at the early history of the island, Mr. Patterson went on to give an account of his personal experiences of the place, as related by him shortly after the visit in the columns of the *Northern Whig*. Referring to the vicissitudes which the inhabitants of the island have suffered from time to time, he said in unfavourable seasons it is next to impossible for the small amount of arable land to produce food enough for even a small population. In recent years more than once the people were reduced to the verge of starvation. On one occasion a severe gale swept immense waves over the island, and carried the greater portion of the crop of corn, which had been partially cut, but not housed, into the sea, washed the potatoes out of the ground, and rendered the fresh water undrinkable; and on other occasions a more or less partial failure of the crops left the poor people partially dependent on the outside world for the supplies which nature denied them at home.

Kelp burning was formerly carried on on the island to a considerable extent. This product of the sea, fresh out of the strong, deep waters of the North Atlantic, was rich in iodine, and found a ready market at remunerative prices in the great chemical works at Glasgow, to which port it was conveyed by the Sligo steamer calling off the island. But the demand for kelp has fallen off, and prices have become so low that it is no longer produced, and the island can export little now except lobsters, as it is difficult to get a quick market for perishable fresh fish, such as mackerel.

There are about fifty houses or families and about 350 or 360 inhabitants on the island. In 1841 the population was returned at 391 males and 200 females, and at that time there were eighty inhabited houses. Speaking of the social condition of the people, he said—There is not a policeman in the place, and there seems to be little or no social distinction as among the people themselves. Till lately there was a “King” of Tory, so called because the other islanders acknowledged his authority and bowed to his decisions in the settlement of disputes; but since the decease, now some years ago, of the last monarch, the authority in such matters seems to have passed into the hands of the resident Catholic curate, the island being in the parish of Cloughnahully, on the mainland of Donegal. The parish priest here, Rev. Mr. M’Fadden, has two curates, each of whom, it is said, takes about a six months’ turn on the island and then on the mainland.

The people pay no taxes. A few years ago the grand jury of Donegal proposed to levy county cess on the island—a gross injustice, as the people make, practically, no use whatever of the roads and bridges of the mainland, and they have none of their own to keep in repair. This unreasonable demand was not persisted in. The rent question is different. The rental of the island, including one penny per annum for the grazing of each sheep, used to be about £240 a year. When good prices were no longer obtainable for kelp the people were unable to pay their former rents, and made, through their

clergyman, an offer of £100 a year to the present proprietor of the island, the Rev. B. St. John Joule. This offer the agent declined ; and since then, five or six years ago, the people have paid no rent at all, and do not apparently expect to have to pay any more. I have a copy of some very acrimonious correspondence that passed between the landlord and others on this subject. The matter seems to have ended—at least for the present—in the landlord's rights being entirely set aside.

Before concluding, let me take a brief glance at the island. Its surface, including three small lakes, two of them brackish, comprises about 1,200 acres, of which perhaps less than one-sixth may be under cultivation. Of wild quadrupeds there are only two—the rabbit and the common mouse—found. There are no reptiles—not even a frog ; and except the sea fowl in the breeding season, when they are numerous, not many birds, and those almost exclusively ground or cliff breeding birds, as there is not a tree and hardly a bush on the island for the arboreal species. I saw some wheatears, buntings, sparrows, and pipits, grey crows, and starlings—the two latter probably visitors from the mainland. The storm petrel still breeds there ; but, from what I could gather, not in the same numbers as they were found by Mr. Hyndman and his companions in 1845. The person I was speaking to about them knew the birds quite well, and called them “Mother Carey's Chickens.” There are a good many poultry and domestic animals on the island ; among these some small sized horses, which are used sometimes with panniers, one suspended on each side, or sometimes in carts without wheels, “slipe” carts as they are called. The shafts of these carts are lengthened backwards, and drag along the ground. Mr. Patterson concluded a highly interesting paper by relating a humorous story by the Rev. John Brown concerning the introduction of the horse into Tory.

A number of photographs, taken by Mr. Stelfox during the visit, were exhibited.

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Ward, Isaac W., Colin View Terrace,	do.
Wilson, James, Old Forge, Dunmurry.	
Wilson, John K., Marlborough Park,	Belfast.
*Wilson, Robert M., Dublin.	
Workman, Charles, M.D., Newton Terrace, Glasgow.	
Workman, Francis, College Gardens,	Belfast.
Workman, John, J.P., Windsor,	do.
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Workman, Rev. Robert, Newtownbreda,	Belfast.
*Workman, Thomas, J.P., Craigdarragh,	do.
Workman, William. Nottinghill,	do.
Wright, Joseph, F.G.S., York Street,	do.
Young, Robert, C.E., Rathvarna,	Belfast.
*Young, Robert Magill, B.A., Ardgreenan,	do.

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Milligan, Seaton Forrest, Royal Terrace,	do.
Mulholland, J. R. T., J.P., Northumberland Street,	do.
Murray, Robert, Corporation Street,	do.
M'Auliffe, George, J.P., Southbush, Greenisland.	
Oakman, Nicholas, Prospect Terrace,	Belfast.
Pim, Joshua, Slieve-na-Failthe, Whiteabbey.	
Pring, Richard W., Firmount, Fortwilliam Park,	Belfast.
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Watt, R., C.E., Victoria Street,	Belfast.
Webb, Richard T., Greenisland.	
Wolff, G. W., The Den, Strandtown,	Belfast.
Young, Samuel, Huntly Villas, Derryvolgie Avenue,	do.

LIST OF BOOKS RECEIVED DURING THE YEAR.

-
- ADELAIDE.—Transactions, Proceedings and Report of the Royal Society of South Australia, 1885. *The Society.*
- BERLIN.—Verhandlungen der Gesellschaft für Erdkunde. Vol. 12, nos. 4, 5, 6, 7, 8, 9, 10, 1885. Vol. 13, nos. 1, 2, 3, 4, 1886. *The Society.*
- BOLOGNA.—Rendiconto delle sessioni delle. R. Accademia della Scienze, 1884-85. *The Society.*
- BOSTON, U. S. A.—Proceedings of the Boston Society of Natural History. Vols. 22 and 23, 1884-85. *The Society.*
- Science Observer. Vol. 4, 47, no. 11. *The Editor.*
- BREMEN.—Abhandlungen vom Naturwissenschaftlichen Vereine. Vol. 9, part 2, 1885; part 3, 1886. *The Society.*
- BRESLAU.—Zeitschrift für Entomologie, (new series), part 10, 1885. *The Society.*
- BRIGHTON.—Inaugural Addresses, Brighton and Sussex Natural History Society, 1884-85. *The Society.*
- Annual Report of the Brighton and Sussex Natural History Society, 1885. *The Society.*
- BRUSSELS.—Bulletin de la Société Royale de Botanique de Belgique. Vol. 24, part 1, 1885. *The Society.*
- Comptes-Rendu de la Société Entomologique. 3rd series, nos. 57 to 72, 1885. *The Society.*
- Comptes-Rendu de la Société Royale de Botanique de Belgique. Vol. 24, part 1, 1885. *The Society.*

BRUSSELS—*Continued.*

Annales de la Société Malacologique de Belgique. Vol. 13, 1878; 14, 1879; 15, 1880; 18, 1883; 19, 1884. Procès Verbaux des Séances. Vol. 14, 1885.

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BUENOS AYRES.—Academia Nacional de Ciencias, Actas. Vol. 5, part 2, 1884; Boletín, Vol. 8, parts 2 and 3, 1885.

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CAMBRIDGE, U. S. A.—Bulletin of the Museum of Comparative Zoology. Vol. 11, no. 11, 1885; vol. 12, no. 1, 2, 3, 4, 1886; Annual Report, 1884-85. *The Society.*

CARDIFF.—Report and Transactions of the Naturalists' Society. Vol. 16, 1884-85. *The Society.*

CORDOBA.—Boletín de la Academia Nacional de Ciencias. Actas vol. 5, part 1, 1884; vol. 7, part 4, 1885. *The Society.*

CHRISTIANIA.—Forehandlinger i Videnskabs Selskabet, for 1884. Do. Do. 1885. *The Society.*

DANZIG.—Schriften der Naturforschenden Gesellschaft. New Series, 6th book, parts 2, 3, 1885-86. *The Society.*

DUBLIN.—Royal Dublin Society's Transactions. Vol. 3, series 2, parts 4, 5, 6, 7, 8, 9, 10, 1884-85; Proceedings, vol. 4, parts 5, 6, 7, 8, 9, 1884-85; Proceedings, vol. 5, parts 1, 2, 1886. *The Society.*

EDINBURGH.—Transactions and Proceedings of the Botanical Society. Vol. 15, part 2, 1885; vol. 16, part 1, and 2, 1886. *The Society.*

- EMDEN.—Naturforschenden Gesellschaft, 69th year, 1883-84 ;
70th year, 1884-85. *The Society.*
- ESSEX.—Transactions Essex Field Club. Vol. 4, part 1, 1885.
Journal of Proceedings, 1885 ; Appendix. *The Society.*
- FLORENCE.—Bulletino della Societa Entomologica Italiana,
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- GENOA.—Giornale della Societa di Letture e Conversazioni
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(*Fasc.*)s anno 9, 1° Semestre, (*Fasc.*), 1, 2, 1886.
- GIESSEN.—Oberhessischen Gesslleschaft for Natur-und Heil-
kunde, 23 vol, 1884. *The Society.*
- GLASGOW.—Proceedings and Transactions of the Natural
History Society. Vol. 5, part 3, 1882-83 ; vol., 1,
(N.S.) part 2, 1883-4-5. Index, vols. 1 to 5, 1 1884
and 2 1886. *The Society.*
- Proceedings Philosophical Society. Vol. 16. *The Society.*
- KOLOZSVART.—Magyar Novenytani Lapok. (8 évfolyam), 1884,
and (9 évfolyam), 1885. *The Society.*
- LAUSANNE.—Bulletin de la Société Vaudoise des Sciences Natur-
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1886. *The Society.*
- LEIPZIG.—Sitzungsberichte der Naturforschenden Gesellschaft,
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- LIVERPOOL.—Proceedings of the Literary and Philosophical
Society. Vol. 38, for 1883 and 1884. *The Society.*
- LONDON.—Journal of the Royal Microscopical Society. Series
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6, parts 1 and 2, 1886 ; 49a index. *The Society.*

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lichen Vereins, 1883-84, 1885. *The Society.*

- PADUA.—Bulletin, Societa Veneto Trentina di Scienze Naturali.
Vol. 3, no. 3, 1885; Atti, vol. 9, (*Fasc.*) 2, 1885.
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- PHILADELPHIA (U.S.A.)—Proceedings of the Academy of Natural Sciences. Nos. 1, 2, 3, 4, 5, 6, 1862; nos. 1, 2, 3, 4, 5, 1865; nos. 1, 2, 1881; no. 3, 1882; part 1, 2, 1885.
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- PISA.—Atti Della Societa Toscana di Scienze Naturali Processa Verbali. Vols. 4 and 5, 1885-87. *The Society.*
- RICHMOND (Indiana, U.S.A.)—Bulletin of the Brookville Society of Natural History, 1885. *The Society.*
- RIO DE JANEIRO.—Conference Faite au Museum National, 1885.
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- ROME.—Atti della Realle Accademia dei Lincei. Series 4, vol. 1, parts 10 to 18, and 20 to 26; 27, 28, 1885.
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- SONDERSHAUSEN.—Irmischia Korrespondenzblatt des Botanischen Vereins fur Thuringer. Parts 4, 5, 6, 7, 8, 9, 10, 11, 12, 1885. *The Society.*
- STOCKHOLM.—Das Gehororgan der Wirbelthiere, von Gustaf Retzius. Vol. 2, 1884. *The Author.*
Academia Royale des Sciences Handlunger, (Memoirs). Vols. 18, 19, 1880, parts 1, 2, 1881.
Bihang, (Supplement to the Memoirs). Vol. 6, parts 1, 2; vol. 7, parts 1, 2, 1885; vol. 8, parts 1, 2, 1880-84.
Ofversigt, (Bulletin), 1881, 1882, 1883.
Lefnadsteekningar, (Biographies) of Members. Vol. 2, part 2, 1883. *The Society.*
- STUGGART.—Europaische Fauna oder Verzeichnung der Wirbelthiere Europa's. Vol. 1 and 2; by Dr. Heinrich Schinz, 1840. *Lord Clermont.*

TORONTO.—Proceedings of the Canadian Institute. Vol. 2,
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to 18, and 20 to 32, 1885 ; 1 no. 1886 ; Section für
Geflügelzucht, 2nd year, nos. 1 to 26. *The Society.*

WARWICK.—Annual Report of the Warwickshire Natural His-
tory and Archaeological Society, 1884-85. *The Society.*

Proceedings of the Warwickshire Naturalists' and Arch-
aeologists' Field Club, 1884. *The Club.*

WASHINGTON.—Report of the Department of Agriculture, 1884.
The Department.

Geological Survey. 4th Annual Report, 1882-83.
The Survey.

Smithsonian Contributions to Knowledge. Vols. 24 and
25, 1885 ; Annual Report, 1883. *The Society.*

Bureau of Ethnology. 2nd Annual Report, 1880, 1881,
1883 ; 3rd Annual Report, 1881, 1882, 1884.
The Society.

ZURICH.—Vierteljahrschrift der Naturforschenden Gesellschaft.
26th year, 4 parts, 1881 ; 27th year, 1, 2, 3 and 4 parts,
1882 ; 28th year, 1, 2, 3 and 4 parts, 1883 ; 29th year,
1, 2, 3 and 4 parts, 1884. *The Society.*

